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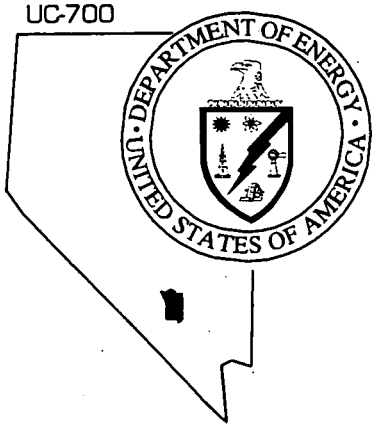

Rulison Site Groundwater Monitoring Report Fourth Quarter, 1997

February 1998

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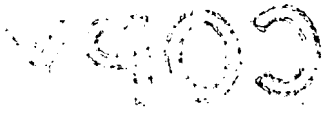

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DOE/NV-460
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RULISON SITE
GROUNDWATER MONITORING REPORT
FOURTH QUARTER, 1997

DOE Nevada Operations Office
Las Vegas, Nevada

February 1998

RULISON SITE
GROUNDWATER MONITORING REPORT
FOURTH QUARTER, 1997

Approved by: _____ Date: 2/9/98
Monica Sanchez, Project Manager
Off-Sites Subproject

Approved by: _____ Date: 2/9/98
Michael O. Giblin, Acting Project Manager
Nevada Environmental Restoration Project

Table of Contents

Table of Contents *(Continued)*

List of Figures

List of Tables

List of Acronyms and Abbreviations

AEC	U.S. Atomic Energy Commission
Austral	Austral Oil Company
BTEX	Benzene, toluene, ethylbenzene, and xylenes
COPC	Constituent(s) of potential concern
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ft	Foot (feet)
H_2SO_4	Sulfuric acid
HCl	Hydrochloric acid
HNO_3	Nitric acid
km	Kilometer(s)
m	Meter(s)
mi	Mile(s)
ml	Milliliter(s)
MS/MSD	Matrix spike/matrix spike duplicate
NPDES	National Pollutant Discharge Elimination System
QAPP	Quality Assurance Project Plan
QC	Quality control
RCRA	*Resource Conservation and Recovery Act*
RPD	Relative percent difference(s)
SGZ	Surface ground zero
TPH	Total petroleum hydrocarbons
TDS	Total dissolved solids
TSS	Total suspended solids
VOC	Volatile organic compound
C	Degree(s) Celsius
F	Degree(s) Fahrenheit
µg/L	Microgram(s) per liter
µS/cm	Microsiemen(s) per centimeter

1.0 Introduction

This report summarizes the results of the fourth quarter 1997 groundwater sampling event for the Rulison Site, which is located approximately 65 kilometers (km) (40 miles [mi]) northeast of Grand Junction, Colorado. This is the eighth and final sampling event of a quarterly groundwater monitoring program implemented by the U.S. Department of Energy (DOE). This program monitored the effectiveness of remediation of a drilling effluent pond that had been used to store drilling mud during drilling of the emplacement hole for a 1969 gas stimulation test conducted by the U.S. Atomic Energy Commission (AEC) (the predecessor agency to the DOE) and Austral Oil Company (Austral).

1.1 Site Location

The Rulison Site is located in the North ½ of the Southwest ¼ of Section 25, Township 7 South, Range 95 West of the 6th Principal Meridian, Garfield County, Colorado, approximately 19 km (12 mi) southwest of Rifle, Colorado, and approximately 65 km (40 mi) northeast of Grand Junction, Colorado (Figure 1-1). The site is situated on the north slope of Battlement Mesa on the upper reaches of Battlement Creek, at an elevation of approximately 2,500 meters (m) (8,200 feet [ft]). The valley is open to the north-northwest and is bounded on the other three sides by steep mountain slopes that rise to elevations above 2,927 m (9,600 ft).

1.2 Project Description and Background

Project Rulison, a joint AEC and Austral experiment, was conducted under the AEC's Plowshare Program to evaluate the feasibility of using a nuclear device to stimulate natural gas production in low-permeability, gas-producing geologic formations. The experiment was conducted on September 10, 1969, and consisted of detonating a 40-kiloton nuclear device at a depth of 2,568 m (8,426 ft) below ground surface. Natural gas production testing was conducted in 1970 and 1971 (AEC, 1973).

The site was deactivated by the AEC and Austral in 1972 and abandoned in 1976. Cleanup associated with site abandonment consisted of removing all remaining equipment and materials, plugging the emplacement (R-E) and reentry (R-EX) wells (Figure 1-2), backfilling the mud pits adjacent to the R-EX well, removing the tritium-contaminated soils, and conducting extensive surface soil sampling and analysis to characterize the radiological condition of the site.

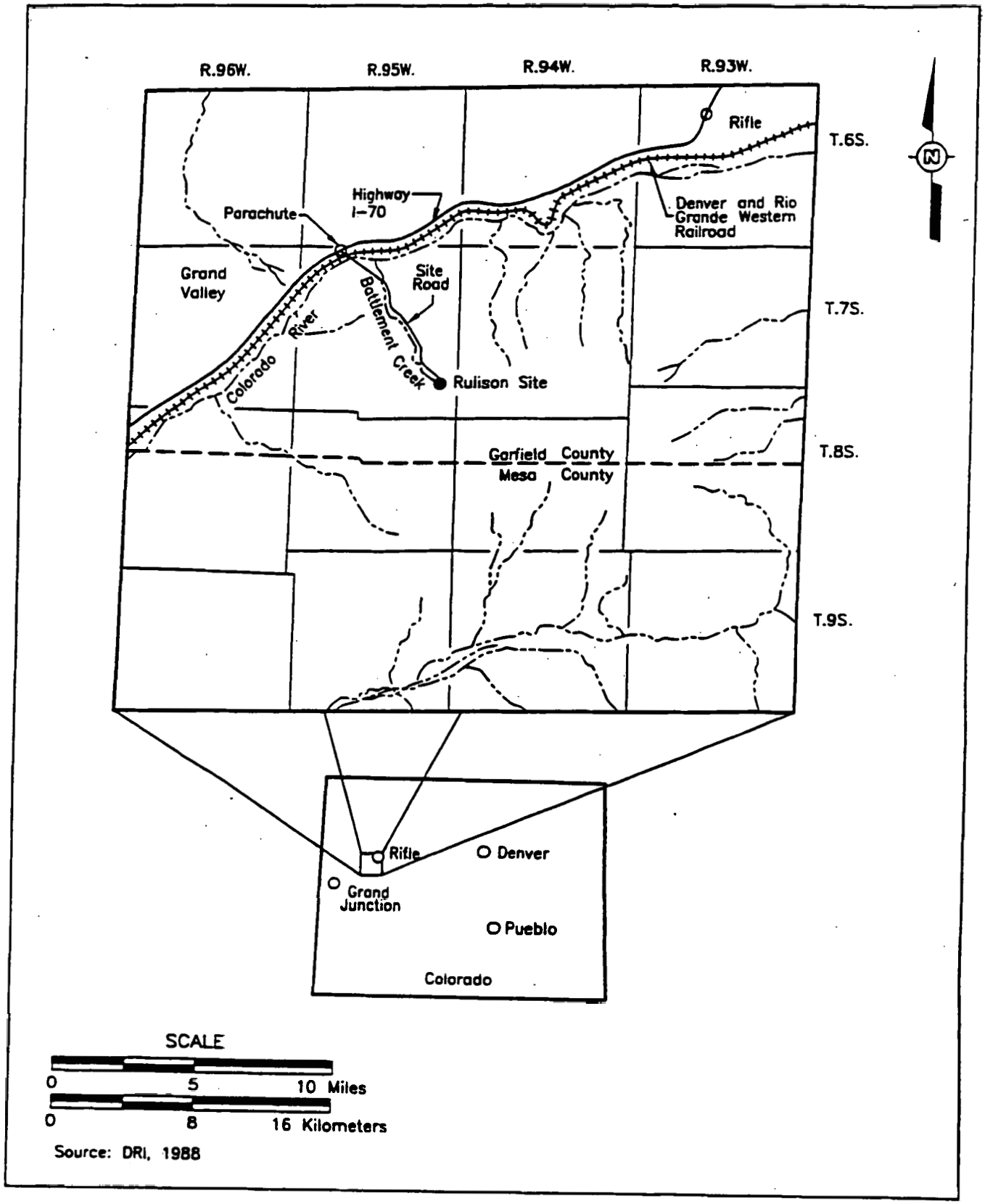

Figure 1-1
Rulison Site Location Map

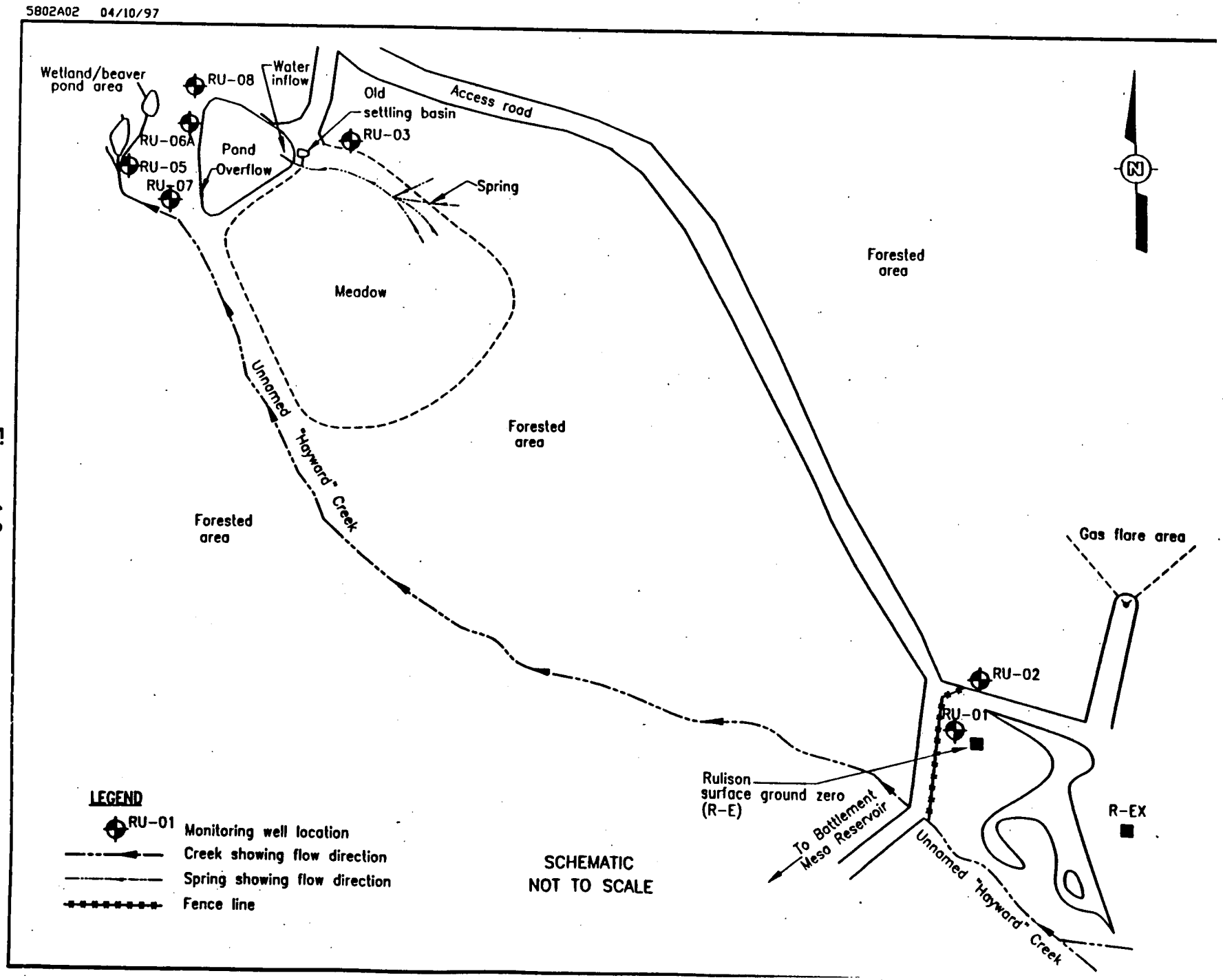

Figure 1-2
Monitoring Well Locations

Detailed descriptions of the site deactivation and abandonment activities and radiological characterizations are presented in the *Rulison Site Cleanup Report* (AEC, 1973), the *Project Rulison Well Plugging and Site Abandonment Final Report* (ERDA, 1977), and the *Rulison Radiation Contamination Clearance Report* (Eberline, 1977).

The drilling effluent pond is an engineered structure located approximately 400 m (1,312 ft) north-northwest of the surface ground zero (SGZ) emplacement well R-E (Figure 1-2). The pond covers approximately 0.5 hectare (1.2 acres) as measured at the top of the berm; it is triangular in shape; and it is approximately 6 m (20 ft) deep from the top of the berm to the pond bottom. The drilling effluent pond was used to store nonradioactive drilling fluids generated during drilling of well R-E, the device emplacement hole. The drilling fluids consisted of bentonite drilling mud that contained various additives, such as diesel fuel and chrome lignosulfonate, used to improve drilling characteristics. Most of the drilling wastes were removed from the pond when the site was cleaned up and decommissioned in 1976; however, some drilling fluid was left in the pond. At the request of the property owner, the pond structure was left in place following completion of site decommissioning and was subsequently converted by the property owner to a freshwater holding pond containing aquatic vegetation, amphibians, and stocked rainbow trout.

In 1994 and 1995, four pond sediment sampling events were conducted to evaluate the extent of residual contamination from drilling wastes remaining in the pond. Concentrations of diesel-range total petroleum hydrocarbons (TPH); benzene, toluene, ethylbenzene, and total xylenes (BTEX compounds); barium; chromium; and lead were found in pond sediment samples and soil samples taken from an old settling basin located adjacent to the pond. Based on the results of the 1994 and 1995 sampling events, the DOE decided to conduct a voluntary cleanup action at the pond to reduce the levels of TPH and chromium in pond sediments and soils in and adjacent to the pond. The cleanup was completed in November 1995. One upgradient monitoring well (RU-03 on Figure 1-2) and four downgradient monitoring wells (RU-05, RU-06A, RU-07, and RU-08) were installed around the pond to monitor the effectiveness of the cleanup. A detailed description of pond cleanup and well installation is presented in the *Rulison Site Corrective Action Report* (DOE, 1996b).

1.3 Summary of Site Activities

The fourth quarter 1997 sampling event was conducted on November 6, 1997, by personnel from IT Corporation representing the U.S. Department of Energy, Nevada Operations Office. Three out of the five wells scheduled for sampling had a sufficient volume of water to be sampled. The weather was clear with temperatures ranging from 5 to 10 degrees Celsius (C) (41 to 50 degrees Fahrenheit [F]). There was an intermittent light breeze and patches of icy snow on the ground. No other unusual observations were made.

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2.0 Sampling and Analysis Procedures

The fourth quarter 1997 groundwater sampling event was conducted in general accordance with the *Rulison Drilling Effluent Pond Site Long-Term Groundwater Monitoring Plan* (DOE, 1996a) and the *Rulison Site Quality Assurance Project Plan, Rulison Site, Colorado* (QAPP) (DOE, 1996c). The National Pollutant Discharge Elimination System (NPDES) permit number COG-310084, that originally guided the discharge of water from the Rulison Pond during activities in 1996, was canceled by the State of Colorado Water Quality Control Division at the request of the Department of Energy (see Appendix A). The official letter canceling the NPDES permit was dated November 18, 1997; however, a cancellation was granted verbally on October 28, 1997 (Appenzeller-Wing, 1997).

2.1 Groundwater Level Measurement

Before purging and sampling activities at each well began, the depth to groundwater and total depth of the well were measured. This information was used to evaluated any changes to groundwater flow direction since the previous sampling event.

2.2 Well Purging

Monitoring wells were purged of stagnant groundwater using disposable bailers. The pH, temperature, and conductivity of the groundwater were taken prior to discharging any water to the surface and then taken at regular intervals thereafter. Purging was considered complete when the groundwater quality parameters stabilized over at least two consecutive readings of pH, temperature, and conductivity. The pH values ranged from an initial value of 6.4 to 7.4. Temperature of the groundwater ranged from 4.9 to 8.8 C (40.8 to 47.8 F), and electrical conductivity ranged from 371 to 844 microSiemens per centimeter (µS/cm). Water was discharged to the ground surface in the same manner as in previous sampling events.

2.3 Sample Collection and Handling

Groundwater samples were collected from Wells RU-03, RU-06A and RU-08 with disposable bottom-emptying bailers. For quality control (QC) purposes, one duplicate sample, one matrix spike/matrix spike duplicate (MS/MSD), and an equipment rinse blank sample were collected during the sampling event. In addition, a trip blank accompanied all volatile organic samples in their shipping container. Samples were containerized and preserved as specified in Table 2-1. All containers were certified clean by the laboratory and remained sealed until ready for use.

2.4 Sample Analysis

The groundwater samples from the fourth quarter 1997 sampling event were analyzed for the parameters listed in Table 2-1. This table was modified from the one specified in the Rulison *Drilling Effluent Pond Site Long-Term Groundwater Monitoring Plan* (DOE, 1996a) and seen in previous quarterly groundwater monitoring reports. Parameters analyzed for include the constituents of potential concern (COPCs) identified for the drilling effluent pond sediments (TPH, BTEX, barium, chromium, and lead analyzed through *Resource Conservation and Recovery Act* [RCRA] total metals). The analysis for total recoverable chromium, iron, and zinc (method SW-846 3005/6010A) and potentially dissolved lead (method SW-846 6010A) were eliminated because they were associated with the NPDES permit. RCRA dissolved metals with mercury were analyzed in order to compare the results with total metals.

Table 2-1
Rulison Site Groundwater Monitoring Program
Sample Container, Preservation, and Analytical Requirements

Parameter	Analytical Method	Sample Container	Minimum Amount of Sample Required	Holding Time[a]	Preservative
BTEX	SW-846[b] 8020A	Glass with Teflon™- lined cap	3 x 40 ml	14 days	pH <2 with HCl Cool to 4 C
TPH (diesel fraction)	SW-846 8015M[c]	Amber Glass	1 liter	14 days	pH <2 with H_2SO_4 Cool to 4 C
RCRA[d] Total Metals with Mercury	SW-846 6010A/ 7470A	Polyethylene	1 liter	180 days	HNO_3 to pH <2 Cool to 4 C, unfiltered
RCRA[d] Dissolved Metals with Mercury	SW-846 6010A/ 7470A	Polyethylene	1 liter	180 days	HNO_3 to pH <2 Cool to 4 C, filtered
Total Dissolved Solids (TDS)	EPA 160.1[e]	Polyethylene	100 ml	7 days	Cool to 4 C
Total Suspended Solids (TSS)	EPA 160.2[e]	Polyethylene	100 ml	7 days	Cool to 4 C

[a] Holding time calculated from verified time of sample collection. Holding time for mercury is 28 days.
[b] U.S. Environmental Protection Agency, SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition (EPA, 1990)
[c] EPA SW-846, modified according to the California State Water Resources Control Board, *Leaking Underground Fuel Tank Field Manual, Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure*, Appendix B (1989)
[d] *Resource Conservation and Recovery Act*
[e] U.S. Environmental Protection Agency, *Methods for Chemical Analysis of Water and Wastes*, (EPA, 1983)

HCl = Hydrochloric acid
H_2SO_4 = Sulfuric acid
HNO_3 = Nitric acid
ml = Milliliter(s)
C = Degree(s) Celsius

3.0 Analytical Results

The fourth quarter 1997 analytical results for the pond cleanup COPCs (diesel-range TPH, BTEX, barium, chromium, and lead) for the drilling effluent pond monitoring wells are presented in Table 3-1. Samples were collected from wells RU-03, RU-06A, and RU-08, but wells RU-05 and RU-07 were dry and could not be sampled. Appendix B contains the laboratory report of the results for all analyses for the fourth quarter of 1997 sampling event. A review of the analytical data for laboratory method blanks was performed to ensure that the COPC concentrations reported for the groundwater samples were representative of groundwater quality rather than laboratory contamination. The following sections provide a discussion of the fourth quarter 1997 groundwater sampling results.

3.1 BTEX

Benzene, toluene, ethylbenzene, and xylene were not detected in any of the samples collected for the fourth quarter 1997 sampling event.

3.2 Diesel-Range TPH

Diesel-range TPH was not detected in any of the groundwater samples from the fourth quarter 1997 sampling event.

3.3 Inorganics

Rulison fourth quarter 1997 groundwater monitoring samples were analyzed for RCRA total metals with mercury, as in previous sampling events (Table 3-1). In addition to this analysis, RCRA dissolved metals with mercury were analyzed for in the 4th quarter of 1997. The sample for RCRA dissolved metals was run through a 0.45 micron filter prior to preservation. By comparing the RCRA total metals with the RCRA dissolved metals, it can be determined if the COPCs are dissolved in the groundwater or are associated with suspended solids. Table 3-2 compares the RCRA total metals results with the RCRA dissolved metals results.

The fourth quarter 1997 groundwater samples for RCRA total metals from all wells contained barium at levels ranging from 113 to 155 micrograms per liter (µg/L). In the RCRA dissolved metals samples, barium ranged from 70.2 µg/L to 109 µg/L. Chromium was detected in the RCRA total metals samples for all three wells, but not in the RCRA dissolved metals samples.

Table 3-1
Rulison Site Groundwater Analytical Results
Fourth Quarter, 1997 (All results in µg/L)
(Page 1 of 3)

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
TPH - Diesel								
RU-03	100U	94U	500U	500U	1000U	1000U	1000U	940U
RU-05	100UJ[1]	94U	NS	NS	NS	1100U	1000U	NS
RU-06A	100U	71R	500U	500U	1000U	1000U	1000U	940U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	100UJ	94U	NS	NS	NS	1300U	1000U	940U
Benzene								
RU-03	0.5U	0.5U	1U	1U	1U	0.50U	2.5	1.0U
RU-05	0.5U	0.5U	NS	NS	NS	0.50U	1.0U	NS
RU-06A	0.5U	0.5U	1U	1U	1U	0.50U	1.0U	1.0U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	0.5U	0.5U	NS	NS	NS	0.50U	1.0U	1.0U
Toluene								
RU-03	0.5U	0.5U	1U	1U	1U	1.0U	3.9	1.0U
RU-05	0.5U	0.5U	NS	NS	NS	1.0U	1.0U	NS
RU-06A	0.5U	0.5U	1U	1U	1U	1.0U	1.0U	1.0U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	0.5U	0.5U	NS	NS	NS	1.0U	1.0U	1.0U
Ethylbenzene								
RU-03	0.5U	0.5U	1U	1U	1U	1.0U	1.0U	1.0U
RU-05	0.5U	0.5U	NS	NS	NS	1.0U	1.0U	NS
RU-06A	0.5U	0.5U	1U	1U	1U	1.0U	1.0U	1.0U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	0.5U	0.5U	NS	NS	NS	1.0U	1.0U	1.0U

Table 3-1
Rulison Site Groundwater Analytical Results
Fourth Quarter, 1997 (All results in µg/L)
(Page 2 of 3)

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
Xylenes (total)								
RU-03	0.5U	0.5U	1U	1U	1U	1.0U	2.0U	2.0U
RU-05	0.5U	0.5U	NS	NS	NS	1.0U	2.0U	NS
RU-06A	0.5U	0.5U	1U	1U	1U	1.0U	2.0U	2.0U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	0.5U	0.5U	NS	NS	NS	1.0U	2.0U	2.0U
Barium								
RU-03	*120*	*110*	105	135	86	90.3	148.0	155
RU-05	*360*	*120*	NS	NS	NS	89.8	425.0	NS
RU-06A	*120*	*120*	119	116	118	130	114.0	113
RU-07	*NS*	*NS*	NS	NS	NS	NS	NS	NS
RU-08	350	*140*	NS	NS	NS	146	127.0	116
Chromium								
RU-03	*10U*	*10U*	1.5U	6.7	2.2	5.0	9.8	9.3
RU-05	*24*	*10U*	NS	NS	NS	1.8	39.2	NS
RU-06A	*10U*	*10U*	1.5U	1.5U	2.5	1.0U	1.0U	4.3
RU-07	*NS*	*NS*	NS	NS	NS	NS	NS	NS
RU-08	*10U*	*10U*	NS	NS	NS	3.1	1.0U	1.3
Lead								
RU-03	*5.6U*	*3U*	1.5	2.3U	2.0U	2.5	6.4	5.3
RU-05	*13U*	*3U*	NS	NS	NS	3.1	18.5	NS
RU-06A	*3U*	*3U*	0.8U	0.8U	2.0U	2.0U	2.0U	2.9
RU-07	*NS*	*NS*	NS	NS	NS	NS	NS	NS
RU-08	*12U*	*3U*	NS	NS	NS	3.5	2.5	2.0U

Table 3-1
Rulison Site Groundwater Analytical Results
Fourth Quarter, 1997 (All results in µg/L)
(Page 3 of 3)

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
				Selenium				
RU-03	*16*	*14*	2.8U	2.8U	4.0U	3.0U	3.0U	**4.0U**
RU-05	*7.2*	*6*	NS	NS	NS	3.0U	3.0U	**NA**
RU-06A	*12*	*20*	2.8U	2.8U	4.0U	3.0U	3.0U	**4.0U**
RU-07	*NS*	*NS*	NS	NS	NS	NS	NS	**NS**
RU-08	*12*	*22*	NS	NS	NS	3.0U	3.0U	**5.0U**

Values in italics are for the dissolved fraction.
Values in bold are the fourth quarter 1997 sampling event results.

NS = Well dry - no sample collected
U = Analyte not detected above the specified value
R = Quality control indicates that the data are unusable (compound may or may not be present).
J = Reported value is estimated.

Table 3-2
Rulison Site Comparison of Analytical Results for RCRA Total and Dissolved Metals with Mercury*
Fourth Quarter, 1997
(All results in µg/L)

Well	RCRA Total Metals with Mercury (unfiltered)	RCRA Dissolved Metals with Mercury (filtered)
RU-03	arsenic 4.2 barium 155 chromium 9.3 lead 5.3	barium 70.2
RU-06A	barium 113 chromium 4.3 lead 2.9	barium 108
RU-06A Duplicate	barium 116 chromium 1.2	barium 109
RU-08	barium 116 chromium 1.3	barium 105

*Constituents that were not detected were not listed.
All Fourth Quarter 1997 Analytical Results are included in Appendix B.

The source of chromium in the groundwater is unknown, but it is suspected that it is naturally occurring in the soils at the Rulison Site. The presence of chromium is not likely to represent migration from the pond sediments. Arsenic was only detected in the RCRA total metals sample from well RU-03 at 4.2 µg/L during the fourth quarter 1997 sampling event. Arsenic was not identified as a COPC for pond cleanup and is likely to be of local natural origin. Lead was detected in the RCRA total metals analysis of two wells, RU-03 (5.3 µg/L), and RU-06A (2.9 µg/L), but was not detected in the duplicate sample of RU-06A. It is likely that a variation in the amount of suspended solids in sample RU-06A and its duplicate resulted in the different values of lead detected. Lead was not detected in any of the RCRA dissolved metals samples. Selenium and mercury were not detected in any of the samples.

In summary, Table 3-2 compares the analytical results for both the RCRA total metals with mercury and RCRA dissolved metals with mercury. Barium, chromium, lead, and arsenic were detected in one or more of the unfiltered samples; however, only barium shows up in the filtered samples. This indicates that the barium is dissolved in the groundwater, but arsenic, chromium, and lead are not dissolved and are associated with the suspended solids in the groundwater.

Concentration trends of inorganics detected in the groundwater at the Rulison Site will be addressed in the closure report for the Rulison Drilling Effluent Pond.

3.4 Groundwater Flow

Groundwater depth and elevation data for the drilling effluent pond monitoring wells from the fourth quarter 1997 sampling event are presented in Table 3-3. Based on the groundwater elevation data, it appears that groundwater flow during the fourth quarter sampling event was generally towards the northwest. Under this flow condition, Well RU-03 is upgradient from the pond; and Wells RU-05, RU-06A, RU-07, and RU-08 are downgradient from the pond. Wells RU-05 and RU-07 were dry.

Table 3-3
Rulison Site Groundwater Elevations
Fourth Quarter, 1997

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	**Fourth Quarter 1997**
Depth to Water (from top of casing)								
RU-03	10.56 m (34.65 ft)	6.81 m (22.33 ft)	12.94 m (42.44 ft)	12.93 m (42.42 ft)	10.90 m (35.75 ft)	3.82 m (12.52 ft)	8.68 m (28.48 ft)	**10.78 m (35.36 ft)**
RU-05	2.35 m (7.71 ft)	1.96 m (6.42 ft)	Dry	Dry	Dry	1.75 m (5.75 ft)	2.79 m (9.15 ft)	**Dry**
RU-06A	4.74 m (15.56 ft)	4.38 m (14.38 ft)	5.55 m (18.20 ft)	4.72 m (15.5 ft)	5.66 m (18.56 ft)	3.79 m (12.45 ft)	4.67 m (15.32 ft)	**5.12 m (16.8 ft)**
RU-07	Dry[a]	Dry	Dry	Dry	Dry	Dry	Dry	**Dry**
RU-08	1.78 m (5.85 ft)	1.70 m (5.58 ft)	Dry	Dry	Dry	1.49 m (4.9 ft)	1.84 m (6.04 ft)	**2.05 m (6.73 ft)**
Groundwater Elevation								
RU-03	2444.29 m (8019.33 ft)	2448.05 m (8031.65 ft)	2441.92 m (8011.54 ft)	2441.92 m (8011.56 ft)	2443.96 m (8018.23 ft)	2451.04 m (8041.46 ft)	2446.17 m (8025.5 ft)	**2444.08 m (8018.62 ft)**
RU-05	2433.95 m (7985.41 ft)	2434.35 m (7986.70 ft)	< 2433.39 m[b] (< 7983.55 ft)	< 2433.39 m[b] (< 7983.55 ft)	<2433.39 m[b] (<7983.55 ft)	2434.55 m (7987.37 ft)	2433.51 m (7983.97 ft)	**< 2433.39 m (< 7983.55 ft)**
RU-06A	2430.10 m (7972.78 ft)	2430.46 m (7973.96 ft)	2429.30 m (7970.14 ft)	2430.12 m (7972.84 ft)	2429.19 m (7969.78 ft)	2431.05 m (7975.89 ft)	2430.18 m (7973.02 ft)	**2429.72 m (7971.54 ft)**
RU-07	<2438.22 m (<7999.40 ft)	<2438.22 m (<7999.40 ft)	<2438.22 m (<7999.40 ft)	<2438.22 m (<7999.40 ft)	<2438.22 m (<7999.40 ft)	< 2438.22 m (< 7999.40 ft)	<2438.22 m (<7999.40 ft)	**<2438.22 m (<7999.40 ft)**
RU-08	2429.05 m (7969.33 ft)	2429.13 (7969.60 ft)	< 2429.01 m (< 7969.18 ft)	< 2429.01 m (< 7969.18 ft)	2428.61 m (7967.88 ft)	2429.34 m (7970.26 ft)	2428.99 m (7969.14 ft)	**2428.63 m (7967.94 ft)**

[a]Well had less than 1 foot of water, so it was considered dry and was not sampled.
[b]Calculated elevation of total depth of well RU-05 was incorrect in previous reports and has been corrected.

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4.0 Quality Control Results

Field and laboratory QC sample requirements and acceptance criteria are specified in the Rulison QAPP (DOE, 1996c). The laboratory narrative for the fourth quarter sampling analytical results is included in Appendix B and provides a summary of the results for laboratory QC samples required under the various analytical methods used for the project. The following sections describe the results for field QC samples not covered by the laboratory narratives because they are not explicit requirements under the analytical methods used, but are required for field sampling under the Rulison QAPP (DOE, 1996c).

4.1 Field Duplicate Samples

Field duplicate samples are used to monitor the variability associated with sample collection procedures and to provide estimates of the total sampling and analytical precision. A duplicate sample was collected from Well RU-06A during the sampling event. The relative percent differences (RPDs) between analytes detected in the original sample and the same analytes detected in the associated field duplicate sample were calculated and compared against the precision acceptance criteria specified in the Rulison QAPP (DOE, 1996c). The sample and sample duplicate results, calculated RPDs, and precision acceptance criteria are presented in Table 4-1.

Barium, chromium, and lead were detected in the RCRA total metals analysis of RU-06A sample (RUW00122), but only barium and chromium were detected in the duplicate sample (RUW00124). The relative percent difference for chromium and lead results for the RCRA total metals samples were not within the precision acceptance criterion of ± 20 percent specified in the Rulison QAPP (DOE, 1996c). This difference can be attributed to the amount of suspended solids contained in the two samples. When the results for RCRA dissolved metals for barium are compared in samples RUW00122 and RUW00124, the RPD was well within the acceptable range. The high RPDs for chromium and lead may also be attributed to a difference in the amount of suspended solids contained in the samples, since no chromium or lead was detected in the RCRA dissolved metals sample. The values of these analytes are small, so even a little variance in the amount of suspended solids would affect the sample result and result in a large RPD.

Table 4-1
Rulison Site Groundwater Monitoring Program
Duplicate Sample Comparison:
Fourth Quarter, 1997
(All results in µg/L)

Analyte	Well RU-6A			RPD Acceptance Criterion
	Sample RUW00122	Sample Duplicate RUW00124	Relative Percent Difference (RPD)	
TPH	940U[1]	940U	ND[4]	± 40
Benzene	1.0U	1.0U	ND	± 11 to 24
Toluene	1.0U	1.0U	ND	± 11 to 24
Ethylbenzene	1.0U	1.0U	ND	± 11 to 24
Xylenes	2.0U	2.0U	ND	± 11 to 24
Arsenic[2]	3.0U	3.0U	ND	± 20
Barium[2]	113.0	116.0	2.6	± 20
Barium[3] (filtered)	108.0	109.0	0.92	± 20
Cadmium[2]	1.0U	1.0U	ND	± 20
Chromium[2]	4.3	1.2	112.7	± 20
Chromium[3] (filtered)	1.0U	1.0U	ND	± 20
Lead[2]	2.9	2.0U	>36.7	± 20
Lead[3] (filtered)	2.0U	2.0U	ND	± 20
Mercury[2]	0.2U	0.2U	ND	± 20
Selenium[2]	4.0U	4.0U	ND	± 20
Silver[2]	1.0U	1.0U	ND	± 20

[1]Analyte not detected above the specified value
[2]Sample result from RCRA total metals. This sample was not filtered.
[3]Sample result from RCRA dissolved metals.
[4]Not Determined, since RPD of a non-detect result cannot be calculated

4.2 Equipment Rinsate Blank Samples

Equipment rinsate blanks are used to monitor potential cross-contamination associated with inadequate equipment decontamination procedures. At Rulison, new, dedicated, disposable bailers were used at each well, eliminating the possibility of cross-contamination between wells. An equipment rinse blank was prepared by pouring deionized water over and through a new, dedicated, disposable bailer. This water was then drained into appropriate sample bottles, which were labeled, packaged, and placed in a cooler with ice. The equipment rinsate sample was analyzed for the same constituents as the groundwater samples, TPH- Diesel, BTEX, and inorganics. All analytical results were at non-detectable levels.

4.3 Trip Blank Samples

Trip blanks are used to monitor potential volatile organic compound (VOC) cross-contamination introduced into VOC sample containers through diffusion during sample shipment and storage. Trip blank samples were placed in each container used for shipping BTEX samples. BTEX compounds were not detected in the trip blank from the fourth quarter 1997 sampling event.

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5.0 Summary and Conclusions

The analytical data from the fourth quarter 1997 groundwater sampling event indicate that migration of contaminants from the drilling effluent pond sediments currently does not appear to be occurring. The following is a summary of the fourth quarter 1997 groundwater sample results:

BTEX Compounds: BTEX compounds were not detected in any of the fourth quarter 1997 groundwater samples or quality assurance samples.

Diesel-Range TPH: Diesel-range TPH was not detected in any of the fourth quarter 1997 groundwater samples or quality assurance samples.

Inorganics: Barium and chromium were detected in all the RCRA total metals samples from upgradient well RU-03 and downgradient wells RU-06A and RU-08. The highest concentration of barium, chromium, and lead for RCRA total metals were detected in upgradient well RU-03. In all wells sampled, only barium was detected in the RCRA dissolved metals analysis. This indicates that barium is dissolved. Lead was detected in RCRA total metals samples from both upgradient well RU-03 and downgradient well RU-06A, but not in well RU-08. Lead and chromium were not detected in the RCRA dissolved metals samples. This indicates that chromium and lead are probably related to suspended solids, and they naturally occur in the soil. The presence of chromium and lead is not likely to represent migration from the pond sediments.

Lead was not detected in the RU-06A duplicate sample for RCRA total metals. This is probably related to a variation in the amount of suspended solids in the sample and sample duplicate from RU-06A. Concentration trends of inorganics detected in the groundwater at Rulison will be addressed in the closure report for the Rulison Drilling Effluent Pond.

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6.0 References

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Appendix A

Purge Water Discharge Permit
and
Letter Terminating Discharge Permit

Purge Water Discharge Permit

STATE OF COLORADO

Roy Romer, Governor
Patti Shwayder, Acting Executive Director
Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80222-1530
Phone (303) 692-2000

Laboratory Building
4210 E. 11th Avenue
Denver, Colorado 80220-3716
(303) 691-4700

Colorado Department
of Public Health
and Environment

March 19, 1996

Mr. Kevin D. Leary
DOE

Subject: Reply to request for addition of source to permit COG-310084.

Dear Mr. Leary:

The Division has received and reviewed your fax of 3/19/96. Since the wells described in your fax are in such close proximity to the pond that the permit was designed to provide dewatering conditions for, the Division
will allow the wells to be dewatered using the same discharge point as described in the permit. Please follow the same conditions and monitoring schedule as described in the permit. The Division realizes that due to the small amount of water in question, the water might not be of sufficient flow to reach the discharge point. Any future purgings of the water from these wells are covered by this letter and the permit noted above as long as the permit remains active and conditions, monitoring schedule and reporting procedure are followed.

Please feel free to call me at (303)+692-3593 with questions or comments.

Sincerely,

Tom Boyce
Environmental Protection Specialist
Permits and Enforcement
WATER QUALITY CONTROL DIVISION

cc.file

Letter Terminating Discharge Permit

STATE OF COLORADO

Roy Romer, Governor
Patti Shwayder, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
Located in Glendale, Colorado

Laboratory and Radiation Services Division
8100 Lowry Blvd.
Denver CO 80220-6928
(303) 692-3090

http://www.cdphe.state.co.us

Colorado Department
of Public Health
and Environment

November 18, 1997

Janet Appenzeller-Wing
U.S. Department of Energy
P.O. Box 98518
Las Vegas, Nevada 89193-8518

RE: Termination of Permit to Discharge
Drilling Effluent Pond Project
Permit No: COG-310084, Garfield County

Dear Ms. Appenzeller-Wing

As a follow-up to your request for termination of the permit referenced above, this letter is an official notice of termination of Colorado Discharge Permit Number COG-310084.

You have certified that all process water discharges have ceased, and all potential pollutant sources have been removed. It is our opinion that this sites does not require a discharge permit at this time. Should you begin operations in the future, and need to discharge process water, you will have to obtain new permit coverage for those discharges.

From this process a refund or additional fee may result and if so, you should receive notification within the next 30 days. Should you have questions on the fee, or should there be other questions on this action, please contact Darlene Casey at (303) 692-3599.

Sincerely,

Phil Hegeman
Permits Unit Manager
Water Quality Protection Section
WATER QUALITY CONTROL DIVISION

cc: Permit Section, EPA, Mike Reed, Permits Team Leader (8P2-W-P)
Local Health Department
Dwain Watson, D.E., Technical Services Unit, WQCD
Leslie Simpson, Compliance Monitoring & Data Management Unit, WQCD
Permit File
Fee File

PH/dc

Water Quality Control Division
Field Support Section

NOV 12 1997
WATER QUALITY

ACTION REQUEST FORM

DATE RECEIVED: _____ LOG NO: _____ BY: _____

TO: ~~[redacted]~~ Dustin Watson SECTION TRANSMITTAL DATE: 03-26-92

Thru: _____ ATTENTION: _____

FROM: Darlene Casey, Permits & Enforcement UNIT

SUBJECT: Termination - U.S. Dept of Energy PERMIT NO: CO9-310084

ACTION/INFORMATION REQUEST

PURPOSE FOR REQUEST: project competed DISCHARGE TO: Haystack Creek

FACILITY CONTACT: Janet Appenzeller-Wing PHONE NO: 1-(702)295-0461

LOCATION/DIRECTIONS AS APPLICABLE: approx. 8 miles South from town of Parachute Valley

Please respond by:* April 26, 1997. Attention: Darlene

* If unable to meet this response date, please notify this office ASAP.

cc: _____

RESPOSE TO ACTION/INFORMATION REQUEST

ATTENTION: _____ DATE: 10/21/97

OK to inactivate

cc: _____

D. Watson
SIGNATURE

Copy Distribution:

White - File Copy
Yellow - Field Support
Pink - Originator

3. Will the permittee continue to have a discharge point, such as pipe, conduit, unlined lagoon, etc? ☐ Yes ☒ No

4. Under what conditions could a discharge occur: Storm flow, change in operation, accidental spill, etc.

5. If this is a mining facility or operation, indicate whether any mine drainage exists. Discuss whether there has been a historical flow.

6. Is there a downstream water user, water supply intake, etc.? ☐ Yes ☒ No

   a. If yes, whom and where?

   b. Could they be impacted by a discharge or a spill of any pollutant on-site controllable under an SPCC Plan or other condition of a permit? ☐ Yes ☒ No

NOTE: THE FOLLOWING SHOULD BE KEPT IN MIND IF YOUR PERMIT IS TERMINATED:

1. The permittee will still be responsible and subject to any enforcement action for any discharge or spills into state waters. Should you operate your facility after your permit has been terminated and a discharge could occur, you must apply for a new permit no less than 180 days prior to the discharge. It is unlawful to discharge pollutants from a point source to state waters without a permit. Section 25-8-608 of the Water Quality Control Act provides for assessing civil penalties of up to $10,000 per day for unlawful discharges.

2. In general the continued existence of a discharge point will be the basis for not terminating a permit at the request of the permittee.

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See 18 U.S.C. 1001 and 33 U.S.C. 1319.

Janet Pennella-Wing — 3/10/97
Authorized Representative — Date

10/17/97

Based upon my verification of the above information obtained during my site inspection, it is my recommendation that this permit be terminated.

[signature] — 10/21/97
District Engineer — Date

OK to inactivate ☒ Yes ☐ No

Water Quality Control Division
Permit Termination Form

Date Sent	07/19/96
Date Received	07-25-96
Date to D.E.	07-26-96
Date Rec'd from D.E.	07-31-96
OK to Terminate	11/19/96

Facility Name: U.S. Department of Energy Vehicle Maintenance & Parking	Permit No.: COG-310084
Legal Contact: Janet Appenzeller-Wing	Legal Contact Phone No: (702) 295-0461
Facility Contact: same	Facility Contact Phone No.: (702) same
Facility Address: P.O. Box 98518	Legal Location: SW 1/4 of Sec. 25, T7S, R95W
Las Vegas, Nevada 89193-8518	County: Garfield

Direction: approx. 8 miles South from town of Parachute Valley, CO.

Please answer the following questions and sign the certification. If you have any questions regarding your facility and the information required, please contact your District Engineer, Dwain Watson at (303) 248-7156.

Purpose of Request project completed. Discharge was to Hayward Creek.

1. Is the construction complete? ☒ Yes ☐ No

   a. If not, is there any plan to complete construction in the future? ☐ Yes ☐ No

   b. If so, is there an estimate of when? ☐ Yes ☐ No

      Date for start-up _____

2. If the facility is operational, is any process or other wastewater being produced? ☐ Yes ☒ No

   How much? _____ gpd

   a. If yes, is the water being treated? ☐ Yes ☐ No

   b. What form of treatment is utilized? Discuss sizes of unit processes and any chemical additions.

   c. Is any of the process or any other wastewater or water being discharged to waters of the state? (This includes groundwater in cases like unlined lagoons.) ☐ Yes ☐ No

      1. If yes, identify discharge point(s).

   d. Is the facility designed to be a non-discharging (evaporative) system. ☐ Yes ☐ No

Appendix B

Fourth Quarter 1997 Analytical Results

Table B-1
Sample Number and Description

Sample Number	Sample Location or Description
RUW00122	Well RU-06A
RUW00123	Trip Blank
RUW00124	Duplicate of RUW00122 at RU-06A
RUW00125	Well RU-03
RUW00126	Equipment Rinsate
RUW00127	Not Collected - Well RU-05 was dry.
RUW00128	Not Collected - Well RU-07 was dry.
RUW00129	Well RU-08

TPH - Diesel

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00122	LAS Sample ID:	L11001-25
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 17:56	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	137%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ (S) MS/MSD RPD

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00124	LAS Sample ID:	L11001-26
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 17:11	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	99%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ (8) MS/MSD RPD

LJ7862STANDARD N R21165 Page 1

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00125	LAS Sample ID:	L11001-27
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 18:41	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	144%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ (SX) 11/13/15D F-PD

LJ7862STANDARD N R21165 Page 1

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00126	LAS Sample ID:	L11001-30
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 19:26	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY		QC Limits
n-OCTACOSANE	170%	*	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ (6d)

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00129	LAS Sample ID:	L11001-31
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 20:10	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	140%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ (24) MS/MSD RPD

LJ7862STANDARD N R21165 Page 1

BTEX

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00122	LAS Sample ID:	L11001-1
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 03:40	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	97%	75-125
BFB	106%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00123	LAS Sample ID:	L11001-4
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 05:38	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	93%	75-125
BFB	105%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00124	LAS Sample ID:	L11001-7
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 06:05	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	94%	75-125
BFB	105%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00125	LAS Sample ID:	L11001-10
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 02:20	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	95%	75-125
BFB	107%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00126	LAS Sample ID:	L11001-19
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 04:42	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	91%	75-125
BFB	101%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00129	LAS Sample ID:	L11001-22
Date Collected:	06-NOV-97	Date Received:	**07-NOV-97**
Date Analyzed:	10-NOV-97 05:08	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	**N/A**	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	**94%**	75-125
BFB	103%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

RCRA Total Metals with Mercury

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00122

Lab Name: L.A.S_____ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: _____ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-32_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	113	B		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	4.3	B		P
7439-92-1	Lead	2.9	B		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	1.0	U		P

113

4.3

2.9

SM

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

CLP

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INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00124

Lab Name: L.A.S_____ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: _____ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-33_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.0	U		P
7440-39-3	Barium___	116	B		P
7440-43-9	Cadmium__	1.0	U		P
7440-47-3	Chromium_	1.2	B		P
7439-92-1	Lead_____	2.0	U		P
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	4.0	U		P
7440-22-4	Silver___	1.0	U		P

116

12

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

FORM I - IN

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02/09/98 Revision 8

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.: RUW00125

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK Case No.: 1107IT SAS No.: _____ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-34

Level (low/med): LOW Date Received: 11/07/97

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	4.2	B		P	4.2
7440-39-3	Barium	155	B		P	155 (SA)
7440-43-9	Cadmium	1.0	U		P	
7440-47-3	Chromium	9.3	B		P	9.3
7439-92-1	Lead	5.3			P	
7439-97-6	Mercury	0.20	U		AV	
7782-49-2	Selenium	4.0	U		P	
7440-22-4	Silver	1.0	U		P	

Color Before: COLORLESS Clarity Before: CLOUDY Texture: _____

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.: RUW00126

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK Case No.: 1107IT SAS No.: _____ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-37

Level (low/med): LOW Date Received: 11/07/97

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	1.0	U		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	1.0	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00129

Lab Name: L.A.S_____ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: _____ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-38_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	116	B		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.3	B		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	5.0			P
7440-22-4	Silver	1.0	U		P

116

13

5.0 U <5x blank correction

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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RCRA Dissolved Metals with Mercury

02/09/98 Revision 8

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1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00122

Lab Name: L.A.S_____ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: _____ SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-39_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	108	B		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	4.0	U	N	P
7440-22-4	Silver	1.0	U		P

108 BM

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00124

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK Case No.: 1107IT SAS No.: _____ SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-40_

Level (low/med): LOW Date Received: 11/07/97

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	109	B		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	4.0	U	N	P
7440-22-4	Silver	1.0	U		P

109 BP

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00125

Lab Name: L.A.S_____ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: _____ SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-41_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	70.2	B		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	7.6		N	P
7440-22-4	Silver	1.0	U		P

70.2 (SQ)

7.6 (SQ) High RPS/MSD %R

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

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INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00126

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK Case No.: 1107IT SAS No.: SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-44

Level (low/med): LOW Date Received: 11/07/97

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	1.0	U		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	4.0	U	N	P
7440-22-4	Silver	1.0	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00129

Lab Name: L.A.S_____ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: _____ SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-45_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	3.0	U		P	
7440-39-3	Barium	105	B		P	105 (Sap)
7440-43-9	Cadmium	1.0	U		P	
7440-47-3	Chromium	1.0	U		P	
7439-92-1	Lead	2.0	U		P	
7439-97-6	Mercury	0.20	U		AV	
7782-49-2	Selenium	5.0	B	N	P	5.0 J (Sap)
7440-22-4	Silver	1.0	U		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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Total Dissolved Solids
and
Total Suspended Solids

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00122
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	400.	10.	40.	1		mg/L	13-NOV-97	L11001-46
NON FILTERABLE RESIDUE	160.2	55974	16	7.0	12.	1		mg/L	13-NOV-97	L11001-53

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00124
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	395.	10.	40.	1		mg/L	13-NOV-97	L11001-4
NON FILTERABLE RESIDUE	160.2	55974	12	7.0	12.	1		mg/L	13-NOV-97	L11001-5

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00125
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	416.	10.	40.	1		mg/L	13-NOV-97	L11001-48
NON FILTERABLE RESIDUE	160.2	55974	381	7.0	12.	1		mg/L	13-NOV-97	L11001-55

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00126
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	<10.	10.	40.	1	U	mg/L	13-NOV-97	L11001-5
NON FILTERABLE RESIDUE	160.2	55974	<7.0	7.0	12.	1	U	mg/L	13-NOV-97	L11001-5

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00129
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	386.	10.	40.	1		mg/L	13-NOV-97	L11001-52
NON FILTERABLE RESIDUE	160.2	55974	176	7.0	12.	1		mg/L	13-NOV-97	L11001-59

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

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